WAYNE STATE UNIVERSITY
COLLEGE OF ENGINEERING

November 21, 2016

Dear FACHEP participant:

On Month DAY, YEAR members of the Flint Area Community Health and Environment Partnership (FACHEP) collected water samples from your home and a swab of biofilm from your shower fixture to test for *Legionella* bacteria. Those samples were assigned a number so that we could easily track them. The water samples collected from your house were assigned the sample ID number of XXXXX.

Legionella is a waterborne bacterium that can cause Legionnaires' disease. Legionnaires' disease is contracted by breathing in water vapor that contains *Legionella* bacteria. While *Legionella* bacteria can be a source of concern, the bacteria reside in natural bodies of water and are often found in low levels in water systems considered to be operating properly. For more information about Legionnaires' disease, please see the attached Frequently Asked Questions document.

Based on our analysis, *Legionella* bacteria was detected in the following samples:

- water from your kitchen sink - <{Legionella species} {concentration} CFU/ml>
- biofilm inside your shower <{Legionella species} {concentration} CFU/ml>
- water from your shower <{Legionella species} {concentration} CFU/ml>
- water from your hot water tank<{Legionella species} {concentration} CFU/ml>

The presence of free chlorine in public water distribution systems is intended to reduce the likelihood that *Legionella* and other bacteria will grow within your home water system. The concentration of free chlorine in the water entering your kitchen was found to be XXX ppm after 5 minutes of flushing.

Additional information regarding what these results mean can be found attached. We thank you for participating in our study of Flint drinking water quality. Our research will continue, and we may contact you again in the future. If you have any questions, please do not hesitate to contact the FACHEP team (844-35-FLINT; flintpartnership@wayne.edu).

Sincerely,

Shawn P. McElmurry, PhD, PE
Principal Investigator FACHEP

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

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Positive Results for *Legionella*	Understanding the implications for you and the water system in your home	
Legionella (CFU/ml) colony-forming units per milliliter	**Level of concern**	**What this means**
<1	little	The detection of organisms suggests the system may permit the growth of *Legionella*.
1–9	low but increased	Depending on the health of residents, additional actions to reduce risk may be warranted.
10–99	moderately high	Improvements to the water system to reduce the growth of *Legionella* are recommended.
100–999	high	The household plumbing system should be serviced by a licensed plumber or remediation specialist to reduce the growth of *Legionella*.
≥1000	very high	**This concentration is above the level known for some forms of *Legionella* to cause disease in susceptible people.** Immediate steps should be taken to reduce risk to those people who are vulnerable to infection (described in FAQ). To ensure the corrective action was effective, *Legionella* analysis should be repeated after the treatment.

How were *Legionella* samples analyzed?

Household water and biofilm samples from your home were tested (1) using a standard microbiological culture method and (2) using a molecular amplification method specific for *Legionella pneumophila*. These methods are used by the US Centers for Disease Control and Prevention (CDC) and by reference laboratories for identification of *Legionella* in water samples. To verify results found in FACHEP laboratories, a subset of water samples collected were also tested by an external reference laboratory. All laboratories used to perform these analyses are certified by the CDC's Environmental Legionella Isolation Techniques Evaluation (ELITE) Program[1].

What does the amount of *Legionella* tell you?

The amount of legionella reported for your home refers to the number of "colony-forming" units (CFU) per milliliter (mL) of water – in other words, the number of living bacterium that were found in each mL of water tested capable of reproducing. While there are currently no standard protocols for residents with confirmed *Legionella* presence in their home plumbing, there are steps you can take to help reduce your risk of getting Legionnaires' disease. Please refer to the attached *Frequently Asked Questions* document for more information.

What does the amount of chlorine tell you?

Chlorine is a common disinfectant used to inhibit microbial growth in public drinking water. While some micro-organisms can sometimes survive in an environment containing chlorine[2], free chlorine is intended to reduce the likelihood that *Legionella* and other bacteria will grow within your home water system. The American Water Works Association recommends maintaining this chlorine level between 0.2 mg/L and 2.0 mg/L at all times in water distribution systems[3].

How was chlorine measured?

The concentration of free chlorine was measured at your kitchen tap after 5 minutes of flushing. This method ensures the concentration of chlorine measured is the concentration entering your home from the water main. This concentration was determined using a widely accepted[4,5] technique involving CHEMetrics Vacu-Vials. These vials contain a chemical called DPD (N,N Diethyl-1,4 Phenylenediamine Sulfate) that reacts with free chlorine to produce a pink to purple color; the darker the color, the greater the concentration of chlorine. The extent of color change is determined using a portable spectrophotometer and the concentration is reported in parts per million (PPM) – parts of chlorine per million units of water sample.

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[1] https://wwwn.cdc.gov/ELITE/Public/ELITEHome.aspx

[2] Haas, C. N., Meyer, M. A., & Paller, M. S. (1983). Microbial alterations in water distribution systems and their relationship to physical-chemical characteristics. *Journal American Water Works Association*, 475-481.

[3] Pontius, F.W. and AWWA. (1990). Water quality and treatment: A handbook of community water supplies. In *Water quality and treatment: a handbook of community water supplies*. American Water Works Association (AWWA); New York. p 1194.

[4] USEPA Methods for Chemical Analysis of Water and Wastes, Method 330.5.

[5] APHA Standard Method, 22nd ed., Method 4500-Cl G-2000

Frequently Asked Questions about Legionnaires' Disease for Flint Residents

What is Legionnaires' disease?

Legionnaires' disease is a kind of pneumonia - an infection of the lungs. Like other types of pneumonia it can lead to complications, especially if not treated quickly.

How do people get Legionnaires' disease?

People can get Legionnaires' disease by breathing in small droplets of water (mist) that contain *Legionella* bacteria. Most people exposed to *Legionella* bacteria do not become ill.

Legionella bacteria occur naturally in freshwater, like lakes and streams. Large water systems, like those found in hospitals, hotels, and other large buildings, can sometimes grow *Legionella* bacteria, if they are not properly maintained. The most common sources of exposure from these types of buildings are:

- Air conditioning systems with cooling towers (tall, open-topped towers on top of buildings used to cool water)
- Hot tubs and spas
- Decorative fountains
- Potable (drinkable) water

In general, *Legionella* bacteria do not spread from one person to another. People don't get Legionnaires' disease from drinking water. However, people may be exposed to *Legionella* bacteria from water that 'goes down the wrong pipe' (aspiration).

Who is most at risk of getting Legionnaire's disease?

Most people exposed to *Legionella* bacteria will not get sick. There are some factors that can increase risk of getting sick, including:

- Being a smoker, or former smoker
- Being 50 years or older
- Having a chronic lung or respiratory condition, like emphysema or chronic obstructive pulmonary disease (COPD)
- Having other medical conditions such as cancer or leukemia, diabetes, kidney failure or HIV/AIDS
- Taking drugs that reduce your ability to fight infections (i.e., steroids and other drugs. If you're not sure if the drugs you are currently taking reduce your ability to fight infection, talk to your doctor.)

Legionnaires' disease is not common in children. It's a good idea to talk to your doctor to find out if you are at increased risk for getting Legionnaires' disease.

When am I more likely to get Legionnaires' disease?

Legionella bacteria grow more easily in warm, stagnant (not moving) water. Although people can get Legionnaires' disease at any time of year, it is more common in summer and fall when temperatures are warmer.

What are the symptoms of Legionnaires' disease?

Legionnaires' disease starts with flu-like symptoms such as fever, headache, muscle aches, and chills. In some people, more serious symptoms can develop in as little as 1 to 2 days, including:

- High fever
- A cough that is usually dry but sometimes produces mucus
- Difficulty breathing
- Chest pains
- Chills
- Diarrhea

How is Legionnaires' disease treated?

Legionnaires' disease can be treated effectively using antibiotics (drugs that kill bacteria in the body). Antibiotics work best if they are given early on in the illness. In most instances, people who get sick with Legionnaires' disease will need treatment in the hospital.

Is there an increased risk for Legionnaires' disease in Genesee County?

Each year, people in Genesee County and other Michigan counties, as well as across the United States will get Legionnaires disease. In most years, about 9 to 11 people will get Legionnaires' disease in Genesee County. Genesee County had 91 cases of Legionnaires' disease during the summers of 2014-2015. The number of people getting Legionnaires' disease is also increasing throughout the United States.

Because Legionnaires' disease can be serious, seeking medical attention quickly is very important. Finding and reporting cases of Legionnaires' disease can also help reduce the risk of other people getting sick by finding possible sources of *Legionella* bacteria early.

What should I do if I think I have Legionnaires' disease?

Seek medical attention immediately if you have symptoms of Legionnaires' disease. It is difficult to tell if it is Legionnaires' disease or another type of pneumonia, so make sure to tell your doctor if you think you may have been exposed to *Legionella* bacteria.

Your doctor can diagnose Legionnaires' disease by conducting x-rays and blood tests. Let your doctor know if you have recently been in a hot tub, stayed in a hotel or traveled.

SHOULD I BE CONCERNED ABOUT *LEGIONELLA* IN MY HOME?

Very few cases of Legionnaires' disease have been traced to homes. We don't know as much about *Legionella* bacteria in home water systems as we do in large building water systems. Home water systems, including water heaters, pipes, shower heads, and faucets that use water that is properly treated should be less likely to have *Legionella* bacteria.

A few studies have looked at patients who got Legionnaires' disease from their homes. From those studies, it appears that spread of *Legionella* bacteria can occur in the home but it's not clear how often this happens. *Legionella* bacteria are much less likely to contaminate the water in houses than large buildings with complex water systems. Single-family or small multiple-family residences should follow current state, county, and city guidelines for their water.

While public health experts believe the risk of getting Legionnaires' disease from a home water system is much smaller than the risk from large water systems, home owners may be able to reduce the risk further by maintaining their water systems.

WATER HEATERS: In some cases, *Legionella* bacteria have been found in residential water heaters. When found, it's more often been in electric water heaters than in gas water heaters. Regularly maintaining the water heater according to manufacturer's instructions is recommended to help reduce the risk of *Legionella* bacteria growth. Most manufacturers recommend that water heaters be flushed on an annual basis. If you cannot locate the manufacturer's instructions, seek the advice of a licensed plumber.

Water scientists, public health officials, and healthcare experts are currently discussing the risks and benefits of increasing the recommended water heater temperature from 120°F to 130°F which may reduce the risk of Legionella bacteria growing. **However, because of the risk of scalding—or being burned by hot water—this is not currently being recommended.** Updated guidelines regarding water heater management for risk prevention will be provided should recommendations change.

SHOWERS: Because they remain damp, shower heads could hold Legionella bacteria. Removing the shower head, manually cleaning it to remove scale and sediment, and soaking it in a mixture of 1 tablespoon of household bleach to 1 gallon of water for about 2 hours will disinfect the shower head.

HUMIDIFIERS: Some homes have whole house humidifiers. You should clean and disinfect humidifiers regularly according to manufacturer's directions. Always unplug the humidifier first. Clean the inside of the humidifier per the manufacturer's instructions, using a mixture such as 1 tablespoon of household bleach to 1 gallon of water, and dry. Thoroughly clean the outside of the humidifier before and after storage.

CPAP Machines and nebulizers should use distilled water and be cleaned per manufacturer's recommendations. If you cannot locate the manufacturer's instructions, the healthcare equipment supplier can provide them.

How can Legionnaires' disease be prevented?

Making sure that hot tubs and warm pools have the right disinfectant (i.e., chlorine) levels is important for killing *Legionella* bacteria. These disinfectant levels can be hard to maintain when water temperature is high. You do not need a special filter to remove Legionella bacteria in your drinking water.

Avoiding smoking is the single most important thing you can do to lower your risk of infection. Smoking increases the chances that you'll develop Legionnaires' disease if you're exposed to Legionella bacteria.

There are no vaccines that can help protect you from Legionnaires' disease. However, there are vaccines available that can prevent other types of pneumonia. Two types of vaccines that are especially important for preventing pneumonia are the pneumococcal and flu vaccines.

All adults 65 years or older should get both kinds of pneumococcal vaccines. And adults younger than 65 with certain health conditions or who smoke are also recommended pneumococcal vaccination. Everyone 6 months or older should get an annual flu vaccine.

Information about maintaining home systems may be found here:

http://www.hvac.com/resource-center/humidifiers/articles/how-to-clean-a-whole-house-humidifier

More information about Legionnaires' disease is available from:

http://www.gchd.us/legionnaires_disease_resources.php

http://www.cdc.gov/legionella/index.html

http://www.osha.gov/dts/osta/otm/legionnaires/faq.html

http://www.nyc.gov/html/doh/html/diseases/cdlegi.shtml

http://www.phila.gov/health/pdfs/diseases/Legionnaires_FAQ_2011.pdf

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